

storm were justified, as follows: Savannah, 28, e.; Smithville, 28, ne.; Wilmington, 25, e.; Macon, 44 ne.; Hatteras, 60, ne.; Kittyhawk, 56, ne.; Cape Henry, 36 nw.; Chincoteague, 28 ne.; Cape May, 32 nw.; Barnegat, 26 ne.

X.—On the 27th and 28th, the pressure remained low in Texas. On the 29th, the low area moved, with only a slight increase in energy, into western Tennessee. On the 30th, it was transferred in an easterly track beyond the coast, and at no point of its path did it manifest any storm violence. In connection with this low area the maximum temperatures of the month occurred at stations in southern and eastern Texas, Mississippi, Tennessee and North Carolina.

XI.—This was a secondary development of the depression just described as x., and the track of the centre of the storm-area is charted slightly to the south of x. This depression was accompanied by quite heavy rains and by general thunderstorms. It exhibited decided storm energy only on the North Carolina coast, where cautionary signals were displayed and justified by the following maximum velocities: Hatteras, 40 ne.; Kittyhawk, 48 ne.; Cape Henry, 38 ne. The maximum temperature of the month along the Gulf and south Atlantic coasts are associated with this low area.

NORTH ATLANTIC STORMS DURING MARCH, 1883.

[Pressure expressed in inches and in millimeters; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during March, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to April 21st. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. p. m., Greenwich mean time.

Seven depressions are charted, but only three of these, namely, iv., v. and vi., appear to have reached the European coasts. Number v. apparently separated when near the twenty-second meridian, one part moving northeastward and the other taking an east-southeasterly direction toward the Bay of Biscay. Number vii., after leaving the coast of the United States, appears to have pursued a course somewhat south of the usual track. The eastward movement of the depressions numbered i., ii. and iii. was checked by the presence of an area of barometric maxima which prevailed over the ocean during the first half of the month and extended from Europe westward to the forty-fifth meridian, the depressions apparently filling up near the edge of the high area. None of the depressions charted have displayed unusual storm-energy; on the contrary, the weather has been much less stormy than is usual during the month of March. In consequence of the area of high-pressure above referred to, easterly and southeasterly winds prevailed during the greater part of the month, and were consequently favorable to vessels bound to the westward.

The following descriptions relate to the storms traced on the chart:—

I.—At the close of February a slight depression occupied the Atlantic near N. 45°, and between W. 40° and 50°. By March 1st, the pressure had decreased and the disturbance exhibited considerable energy as indicated by the following report of Captain Berry, of the s. s. "Périère." At 5 a. m., the barometer began to fall rapidly and at 9 a. m. (in N. 43° 30', W. 47° 09'), the wind hauled to se. and freshened; at 3 p. m. the wind blew in squalls; 4:45 p. m. the storm was at its height, with furious sea running. From 5:30 p. m. to 6 p. m., in the vicinity of the centre, thunder, lightning, hail and higher temperature, with thunder squalls from the nw. and wind from the sw. At the centre, the barometer, after having risen quickly about .15 of an inch, again fell correspondingly and the wind shifted from w. to sw., with very heavy sea from the southward; at 9 p. m. the wind gradually hauled to nw., the barometer began to rise and the gale moderated. The lowest barometric reading during the storm was 29.21, (742.0)." By the 2d, the centre of

disturbance had moved northeastward to about N. 51°, W. 37°; on that day the ship "Festina Lente," in N. 52 16', W. 35 0', reported barometer 29.35 (745.5), wind s. by w., force 10; vessels to the southward of N. 50°, experienced strong westerly gales with snow, while vessels to the east of the centre had moderate southerly gales. By the morning of the 3rd, the disturbance had moved beyond the range of the observations and a great increase of pressure set in over the ocean south of the fiftieth parallel and between W. 30° and 45°, where clearing weather with moderate breezes generally prevailed.

II.—This is probably a continuation of low area i. of chart i. of this REVIEW. On the 2d, the disturbance passed on to the Atlantic from the coast of Nova Scotia, and during the 3d and 4th, the circulation of the winds near the fiftieth meridian, indicated that the centre of disturbance was to the westward of that meridian. On these dates, moderate to strong southerly gales prevailed to the eastward of the storm-centre, while to the westward moderate breezes were reported. By the morning of the 5th, the disturbance had passed to about N. 45°, W. 45°, the barometric pressure near the centre, ranging from 2.69 (751.8) to 29.8 (756.9). An area of high-pressure was situated near W. 40° and extended eastward to the British Isles, in consequence, high easterly and southeasterly winds prevailed near the forty-fifth meridian; the gradients had also increased in the western quadrants, where the northwesterly winds increased in force. Captain Meyer, of the bark "Orpheus," reported as follows: "5th, near N. 45° 33', W. 43° 12', barometer 29.65 (753.1), fresh sse. gale with high cross sea; at 4 p. m. the wind gradually increased until midnight when it blew a whole gale with heavy rain. At 4.30 p. m. of the 5th, the wind shifted to south and southwest and continued to blow with undiminished force." On the 4th, 5th and 6th, the s. s. "Republic," between N. 42° 18', W. 52° 03' and N. 45° 00' W. 40° 00', had strong ssw. to ne. and sse. gales, with black and rainy weather, lowest barometer 29.5 (749.3). The s. s. "Lord Gough" in N. 45° 30' W. 41° 25', also reported: 12.30 p. m., heavy rain, wind shifting from se. to sw., force 8, barometer 29.58 (751.3). At midnight of the 6th, the winds changed to northwesterly and by morning of the 7th, the depression had entirely disappeared, and the area of high-pressure had advanced westward to the sixtieth meridian.

III.—This is a continuation of low area ii. of chart i. The disturbance passed over the Maritime Provinces to the Atlantic during the 7th, and, on the 8th, it was apparently central near N. 42, W. 52°. On the 7th, the s. s. "Weser," in N. 39° 14', W. 62° 13', reported a heavy sw. by s. gale with long cross sea, lowest barometric reading 29.49 (749.0) at 8 p. m.; on the 8th the s. s. "Lord Gough," reported a sudden shift of wind from s. to nw., force 8, barometer 29.65 (753.1). On the 9th the centre of disturbance, moving northeastward, was shown near N. 45°, W. 38°, the pressure having increased while the barometric gradients had decreased in the eastern quadrants, so that only moderate to fresh breezes were generally reported by vessels within the area of disturbance. By the morning of the 10th a considerable increase of pressure appears to have set in over the ocean between W. 40° and W. 50°, and the northwesterly winds increased to moderate gales. This depression disappeared during the day near W. 37°.

IV.—This was probably a secondary development of low areas iii. and iv. of chart i., which are described elsewhere in this REVIEW. During the passage of low area iv. along the coast of the United States, strong southerly gales were reported on the 10th by vessels to the westward of the sixteenth meridian and between N. 30° and N. 40°. On the 11th, the pressure decreased near the Banks of Newfoundland, and, on the 12th, the shifting of the winds indicated that the disturbance was near the eastern edge of the Banks. On that day the winds were moderate to fresh and continued so, during the 13th, as the depression moved northeastward, and the pressure increased but slowly in rear of the disturbance. During the 14th, 15th, and 16th the barometer remained low over the ocean between the forty-fifth and fifty-fifth parallels of latitude and the thirty-

fifth and twenty-fifth meridians, the decrease extending to the British Isles. Vessels within the region just mentioned reported moderate to strong breezes mostly from the west. By the 17th, the disturbance was near the British coasts, but the marine reports, at hand, do not indicate that it exhibited any great storm energy.

V.—This depression was probably closely connected with low area v. of chart i. When that depression was central over the Maritime Provinces, strong northerly gales occurred over the Atlantic from the seventieth meridian westward to the coast of the United States, and on the 16th, the centre of disturbance was apparently situated to the south of Newfoundland. The ship "Cornelius," reported on the 16th, in N. 43° 18', W. 57° 29', barometer 29.45 (748.0), calm; s.s. "City of Berlin," in N. 41° 37', W. 60° 00', barometer 29.29 (744.0), wind sw. by w. force 5, and the s.s. "Daniel Steinmann," near the same position, reported frequent thunder and lightning accompanied by heavy rain showers. Fresh breezes to moderate southerly gales occurred to the east of W. 50° on the 16th, and on the 17th, they changed to northerly, the centre of disturbance having reached N. 43°, W. 36°. The winds remained moderate in force during the day and the barometer near the centre showed no material change, but on the 18th, a considerable increase of pressure took place and the winds moderated to gentle or moderate breezes. During the following day, however, a rapid decrease of pressure occurred and the centre of depression, where the barometer ranged from 29.5 (749.3) to 29.6 (751.8), was shown near N. 48°, W. 22°, attended by strong breezes to moderate gales in the eastern quadrants while the winds to the west of the centre had also increased in force. On the morning of the 20th, this depression apparently passed northeastward toward the Irish coast, while the report of the s.s. "Ptolemy," indicated the presence of another disturbance to the southward of the forty-fifth parallel and probably at some distance from the coast of Spain. On the 19th, in N. 46° 35', W. 23° 20', the barometer began to fall quickly, the decrease in twenty-four hours amounting to .6 inch; on the 20th, in N. 46° 50', W. 18° 20', in read 29.56 (750.8), wind e., force 8. The storm-centre apparently moved northeastward, and on the 21st, it was over the Bay of Biscay, causing strong easterly and northeasterly winds in the northeast quadrant.

VI.—From the 21st to the 25th, the barometer remained low and fluctuating over the region to the southeast of the Maritime Provinces, and stormy weather prevailed off the coast of the United States during that period. On the 26th, the region of least pressure was situated south of Newfoundland; the pressure decreased to the eastward and the winds remained moderate, but in the western quadrants they showed no material diminution of force. On the 27th, the barometric readings within the area of disturbance ranged from 29.1 (739.1) to 29.4 (746.7). On the 28th, the pressure varied from 29.3 (744.2) to 29.5 (749.3), and the depression extended from W. 45° to W. 25°; within this region no high winds were reported. During the 29th, 30th, and 31st, the disturbance apparently moved northeastward along the coasts of the British Isles.

VII.—This is probably a continuation of low area ix. of chart i. It passed off the coast of the Carolinas into the Atlantic on the 26th, accompanied by strong gales. On the 27th, the storm-centre was probably near N. 35°, W. 72°; on that day the s. s. "Finance," reported heavy rain, barometer 29.42 (744.7), wind variable, shifting from nw. to s., se., and nw., the gale being heaviest from the north-northwest, when it attained a force of 7, with very high sea. On the 28th, the ship "W. Woodbury," in N. 34° 31', W. 65° 42', reported barometer 29.44 (747.8), wind shifting from sse., force 4, to nw., force 9, weather cloudy. To the westward the winds moderated considerably and a general improvement took place in the weather. From the 28th to the 31st the pressure remained low over the ocean from Newfoundland eastward to the British Isles, the circulation of the winds in the western portion of the Atlantic indicating that the disturbance was north of the forty-fifth parallel.

OCEAN ICE.

Chart ii. also shows the southern and eastern limits of icebergs in the north Atlantic during the month of March, 1883. This chart is based on reports communicated by ship-masters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

A comparison of this chart with that for the preceding month (February), shows that the ice has moved southward about one degree, the southern limit in March being very near to the forty-first parallel. North of the forty-fifth parallel there appears to have been no easterly movement; on the contrary, the eastern limit in March is about one degree to the westward of that for February. But to the southward of N. 45° a decided movement toward the east is shown, the limit being about two and one-half degrees farther eastward than in the preceding month.

The reports indicate that icebergs and field-ice were most numerous from N. 42° to N. 45°, and between W. 49° and W. 52°. Icebergs and field-ice were reported as follows:

2d.—Bark "Lillian M. Vigus," ran into ice in N. 43°, W. 47°; it extended in all directions as far as could be seen; sailed through it for three days before reaching open water.

4th.—S. S. "Norseman," in N. 45°, W. 47°, and N. 44° 15', and N. 44° 15', W. 49° 00', passed large ice-fields and saw from forty to fifty icebergs.

6th.—S. S. "Glenmavis," in N. 47° 20', W. 45° 00', passed a large iceberg; same day at 5 p. m. entered ice-field and passed through it for several hours, it being sixty miles in length; steered southward for forty miles to avoid more ice-fields. The s. s. "W. A. Scholten," in N. 43° 50', W. 49° 15', passed four icebergs.

7th.—S. S. "Romano," encountered ice in N. 46° 10', W. 47° 04'; got clear of ice in N. 45° 17', W. 49° 01'.

8th.—S. S. "Hammonia," in N. 43° 14', W. 48° 45', sighted twenty icebergs; got clear of ice in N. 42° 40', W. 50° 51'. The bark "J. F. Whitney," in N. 43° 10', W. 50° 15', passed three large icebergs and some drift-ice; ship "J. Weissenhorn," in N. 43° 20', W. 48° 25', passed an iceberg.

9th.—S. S. "Holland," in N. 43° 25', W. 48° 02' passed three small icebergs; ship "J. Weissenhorn," in N. 42° 20', W. 50° 30', passed an iceberg; bark "Enrichette Accame," in N. 43° 25', W. 48° 11', saw a large iceberg; s. s. "Weser," in N. 42° 40', W. 49° 03', passed three icebergs and several pieces of ice.

10th.—S. S. "Holland," in N. 42° 18', W. 51° 33', passed five icebergs; ship "Carl," from 10th to 13th, in N. 42° 30' and from W. 47° to 50°, passed numerous icebergs; ship "Else," in N. 48°, W. 44°, passed an iceberg from one hundred to one hundred and twenty feet high, and about four hundred feet long. The bark "Orpheus," between the 10th and 11th; N. 43° 30', W. 48° 20', to N. 42° 40', W. 49° 50', passed eight large icebergs and several smaller ones; some were about four hundred and fifty feet high; the smallest was about eighty feet high.

11th.—S. S. "Leerdam," in N. 42° 44', W. 49° 18', passed several icebergs, some of which were eighty feet above water, also saw a quantity of field-ice; s. s. "Hermod," in N. 43° 04', W. 49° 15', observed twenty large icebergs, the last iceberg seen to the westward was in N. 42° 42', W. 52° 00', where some field-ice was also observed. From the 11th to the 16th, the ship "Else," between N. 48°, W. 44°, and N. 43°, W. 51°, passed large quantities of field-ice and about thirty icebergs.

12th.—From the 12th to the 15th, ship "Tamerlane," between N. 42°, W. 48°, and N. 43° W. 50°, passed about twenty icebergs, ranging from twenty to one hundred feet in height.

13th.—S. S. "Elbe," in N. 43° 47', W. 47° 22', passed a large iceberg; ship "Arbela," N. 42° 30' W. 50° 37', passed an iceberg; ship "Hamilton Fish," in N. 43° 00', W. 48° 30', saw a number of icebergs; ran ship to the southward to get clear of ice.

14th.—S. S. "Elbe," in N. 42° 25', W. 50° 22', saw a large iceberg, with several smaller pieces near it; s. s. "City of

Berlin," in N. 42° 40', W. 49° 30', saw a large iceberg; s. s. "Notting Hill," in N. 45°, W. 49°, encountered large fields of ice, steamed southward for twenty hours to avoid them; ship "Arbela," in N. 42°, W. 52° 30', passed small ice.

15th.—S. S. "Circassian," in N. 43° 56', W. 47° 15', saw five icebergs of medium size; bark "General Birch" was found fast in the ice in N. 45° 00', W. 48° 30'; bows stove, and vessel abandoned and full of water; ship "Sultan," in N. 42° 32', W. 49° 18', passed several icebergs and a quantity of field-ice; s. s. "Island," in N. 43° 25', W. 48° 23', passed a large number of icebergs and much field-ice; the s. s. "Iowa," in N. 44° 06' W. 47° 28', reported numerous icebergs in sight all day.

16th.—S. S. "Circassian," in N. 43° 05', W. 49° 00', saw two small icebergs and one large one; s. s. "Labrador," in N. 44° 29', W. 49° 11', passed an iceberg; the s. s. "Boston City," encountered an immense ice-field on the Banks; the bark "Diamant," from the 16th, in N. 46° 06', W. 46° 17' to the 19th in N. 43° 42', W. 49° 50', passed through large quantities of field-ice and saw numerous large icebergs.

17th.—S. S. "Circassian," in N. 43° 17', W. 49° 35', saw four large icebergs; s. s. "Abyssinia," in N. 42° 40', W. 49° 30', passed three large icebergs and several detached pieces; s. s. "Gellert," in N. 42° 50', W. 50° 13', passed a large iceberg; s. s. "Labrador," in N. 43° 12', W. 52° 46', passed four large icebergs; the bark "Olbers" reported: run into ice in N. 46° 41' W. 47° 00'; was obliged to tack ship and run east to clear it; saw many icebergs, none of which were less than one hundred feet high, and some were seen twenty miles distant. We saw, in all, forty bergs, none of them smaller than the vessel. The last observed were in N. 44° 26', W. 48° 30'. The bark "Christel," in N. 47° 20', W. 46° 20', fell in with icebergs and field-ice; got clear on the 20th, in N. 44° 43', W. 50° 49'; during that time saw fourteen large icebergs; had considerable metal torn off by ice.

18th.—The s. s. "Rheola," at New York, reported: from N. 44°, W. 50° to N. 43°, W. 52° 30', passed through immense fields of ice, studded with numerous icebergs.

19th.—S. S. "Rotterdam," in N. 43° 47', W. 48° 02', sighted a large iceberg and two small pieces, distant about two miles; s. s. "City of Paris," in N. 42° 39', W. 49° 41', saw an iceberg about five miles to the northward; also in N. 42° 45', W. 49° 00', saw another about ten miles distant.

20th.—S. S. "Fulda," from N. 43° 58', W. 48° 00' to N. 43° 18', W. 50° 43', passed several icebergs and quantities of field-ice.

21st.—S. S. "Stella," in N. 41° 46', W. 49° 48', passed an iceberg about one hundred feet long and thirty feet high, distant about eight miles; s. s. "Critic," between N. 44° 30', W. 48° 30', and N. 43° 30', W. 51° 00', passed about twenty large icebergs and large quantities of field-ice.

22d.—S. S. "Hedwig," in N. 43° 45', W. 48° 12', passed a large iceberg about two hundred feet high; in N. 43° 13', W. 49° 23', passed five others; the s. s. "Lake Huron," at New York, reported: in N. 43° 20', W. 49° 50', passed a number of icebergs.

23d.—S. S. "Servia," in N. 42° 37', W. 49° 52', passed four icebergs.

24th.—The ship "Edward," in N. 45° 30', W. 48° 30', reported: reached an enormous field of ice; could not see open water from the royals, but discovered several icebergs, some very large; sailed along the eastern edge of the ice-field, which appeared to be very compact in s. and sw. direction; proceeded forty miles before getting into navigable water. On the following day, passed six icebergs and some small field-ice.

25th.—S. S. "California," in N. 43° 10', W. 50° 30', passed a large iceberg with flat top.

26th.—S. S. "Britannic," in N. 42° 51', W. 50° 36', passed three icebergs.

29th.—S. S. "Sardinian," in N. 44° 02', W. 51° 33', passed an iceberg.

30th.—S. S. "Alaska," in N. 42° 47', W. 50° 19', saw an iceberg to the northward.

31st.—S. S. "Weser," in N. 44° 58', W. 49° 36', passed several small icebergs and pieces of floating ice; s. s. "Canada," in N. 42° 15', W. 53° 00', saw an iceberg.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for the month of March, 1883, is exhibited on chart iii., by the dotted isothermal lines.

The mean temperature of the month is below the normal in all districts east of the one hundredth meridian, from 0°.6 in the Missouri valley to 6°.5 in the lower lake region. Along the Atlantic coast and in the Ohio valley, the temperature averaged about 4° below the normal; in the Gulf states, about 2°.6, and in Florida 1°.3. In the Rocky mountain regions and on the Pacific coast, the mean temperature is above the normal from less than 1° in the northern plateau to 2°.9 in southern California. On the summit of Mount Washington, New Hampshire, the mean temperature of the month is 11° below the normal, and on the summit of Pike's Peak, Colorado, it is 5°.5 above the normal.

The following are some of the extreme monthly mean temperatures reported from Signal-Service stations:—

Stations reporting highest.	Stations reporting lowest.
Key West, Florida..... 72.7	Mt. Washington, New Hampshire... 0.9
Rio Grande City, Texas..... 71.0	Saint Vincent, Minnesota..... 8.7
Laredo, Texas..... 68.6	Pike's Peak, Colorado..... 13.0
Brownsville, Texas..... 67.5	Moorhead, Minnesota..... 14.1
Yuma, Arizona..... 67.3	Escanaba, Michigan..... 17.4
Punta Rassa, Florida..... 67.1	Mackinaw City, Michigan..... 17.5
San Carlos, Arizona..... 66.3	Fort Stevenson, Dakota..... 17.8
Uvalde, Texas..... 64.6	Marquette, Michigan..... 17.9
Phoenix, Arizona..... 64.5	Alpena, Michigan..... 18.4

The following table has been prepared to show the districts of maximum departures from the normal temperature, with brief remarks upon the distribution of mean temperature for March of each year since 1874. The plus (+) and minus (—) signs denote above and below the normal, respectively:

Year.	Districts.	Departure.	Remarks.
1874	South Atlantic states.....	+ 2	Normal in lake region, New England, middle Atlantic states, and on the Pacific coast; below the normal in the upper Mississippi and Missouri valleys; above the normal in the south Atlantic and Gulf states.
	Upper Mississippi valley.....	— 3	
1875	Upper lakes.....	— 5.3	Below the normal everywhere, except on the Pacific coast and in the south Atlantic states.
	Lower lakes.....	— 5.1	
	Mississippi valley.....	— 5.2	
	Missouri valley.....	— 7.1	
1876	Pacific coast.....	+ 2.1	Below the normal in all districts, except on the Pacific coast.
	Minnesota.....	— 7.5	
	Lower Missouri valley.....	— 5.9	
	Upper Mississippi valley.....	— 4.1	
1877	Minnesota.....	— 6.6	Above the normal on the Atlantic coast; normal in the Gulf states and lower Missouri valley; below the normal over the districts from the lake region westward to the Rocky mountains.
	Upper Mississippi valley.....	— 3.3	
	New England.....	+ 3.4	
	Upper Missouri valley.....	+ 2.3	
1878	Missouri valley.....	+ 22.4	Month very warm throughout the whole country; temperature above the normal everywhere; departures most marked from the Ohio valley and lake region westward to the Rocky mountains.
	Minnesota.....	+ 21.7	
	Upper Mississippi valley.....	+ 15.4	
	Lower Missouri valley.....	+ 14.6	
1879	Upper lakes.....	+ 13.7	Above the normal over the entire country, except slightly below in the Saint Lawrence valley.
	Middle slope.....	+ 7.1	
	Southern slope.....	+ 0.0	
	Western Gulf states.....	+ 5.1	
1880	Northern slope.....	— 7.3	Below the normal from the Missouri valley westward to the Pacific, and in Canada and New England; above the normal from the lakes to the Gulf, and in the middle and south Atlantic states.
	Canadian maritime stations.....	— 5.9	
	Red river (of the north) valley.....	— 5.1	
	Florida.....	+ 4.3	
1881	South Atlantic states.....	+ 3.3	Normal in the lake region; above the normal in the Saint Lawrence valley and in New England; below the normal in other districts east of the Mississippi; above the normal on the middle and north Pacific coast.
	North Pacific coast.....	+ 4.0	
	Northern slope.....	+ 8.5	
	Saint Lawrence valley.....	+ 6.2	
1882	New England.....	+ 3.4	Above the normal in all districts east of the Rocky mountains, and below the normal on the Pacific coast, except in Oregon and Washington Territory.
	South Atlantic states.....	— 4.8	
	Tennessee.....	+ 5.3	
	North Pacific coast.....	+ 7.8	
	Ohio valley.....	+ 4.8	

In the first column of the following table is shown the mean